NATIONAL HYDROGRAPHIC OFFICE

OF

SRI LANKA

NATIONAL REPORT

TO THE

20TH MEETING OF THE NORTH INDIAN OCEAN HYDROGRAPHIC COMMISSION

VTC, 13 -15 JULY 2021

CONTENTS

1. Introduction

The National Hydrographic Office [NHO] of the government of Democratic Socialist Republic of Sri Lanka was established in 1984 under the purview of National Aquatic Resources and Research Agency [NARA]. The National Hydrographic Office has been currently vested with the responsibility of conducting country's Hydrographic and Nautical Charting operations by NARA Act of No. 54 of 1981 as amended by Act No. 32 of 1996.

At present, the NHO is jointly administered by Sri Lanka Navy Hydrographic Service [SLNHS] and NARA, having entered into an MOU in 2016 in order to expedite national hydrographic operations which is demanded by SOLAS regulations. This has enabled joint Hydrographic surveys and expedited updating of existing nautical charts around the country and paved the way for an efficient development in providing of Hydrographic services within the waters of Sri Lanka during the recent past. In addition, this amalgamation has shown a remarkable progress in the field as the same has facilitated to share resources and professionalism to achieve common goals. Thereby, today the NHO of Sri Lanka has been able to complete long outstanding survey requirements within a very short span of time. The principle services of the NHO include conducting of systematic Hydrographic surveys for national, defence and commercial requirements. Further, NHO produces and disseminates information in support of maritime navigation safety and marine environment preservation, exploration and research & management plans.

2. Surveys

Hydrographic surveys, which are conducted by NHO within the waters of Sri Lanka, are a joint effort of the Sri Lanka Navy Hydrographic Service [SLNHS] and NARA. Apart from the said surveys, SLNHS conducts defence surveys in support of naval operations in the country.

Further, NHO has conducted several other surveys around the waters of Sri Lanka in order to update charts of Colombo Harbour, Approaches to Colombo, Galle harbour, Approaches to Galle Harbour, Trincomalee to Kudremalai Point (figure 1) and Mannar Island (figure 2).

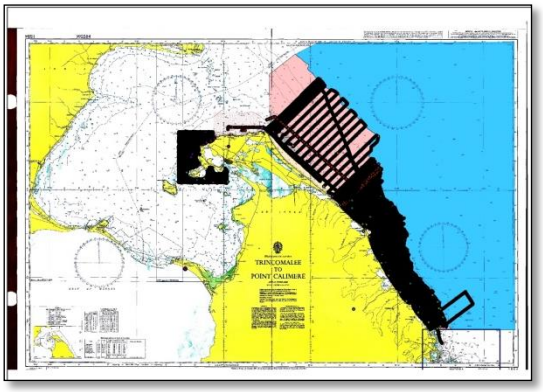

Figure 1 : Bathymetry coverage for Trincomalee to Kudremalai Point Chart

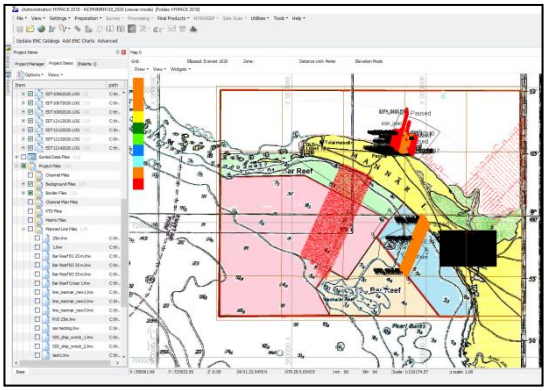

Figure 2 : Bathymetry coverage for Mannar Island chart

Since 2017, SLNHS and the Indian Navy Hydrographic Department have conducted joint surveys and data to be utilized to produce new INT chart Colombo to Sangamankanda. Accordingly, phase III of the survey was conducted covering the area from Kosgoda to Weligama in year 2020 (figure 3).

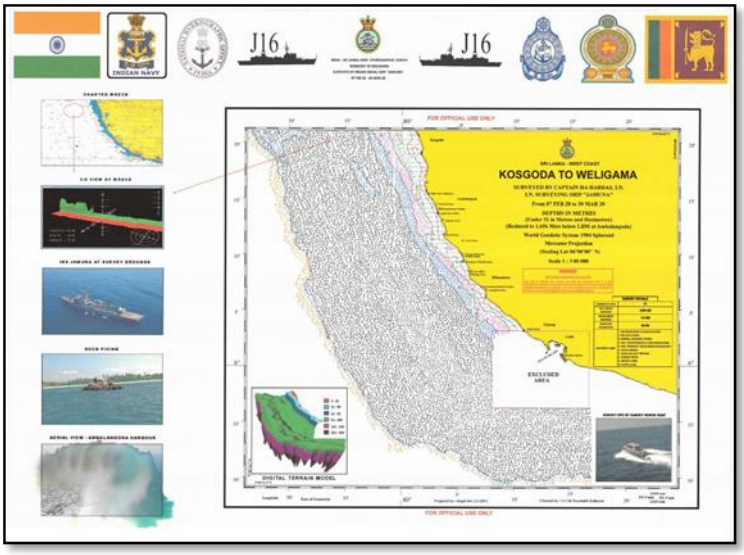

Figure 3: Joint Survey with Indian Navy in 2020

2.1 Coverage of New Surveys

Presently, few surveys are being carried out to produce coastal and approaches charts as indicated in table 1.

SR.No.	Name of the Chart	Scale Band	Remark
01	Approaches to Colombo	4	In progress
02	Colombo Harbour	5	-do-
03	Colombo to Weligama	3	-do-
04	Colombo to Sangamankanda	3	-do-
05	Trincomalee to Kudiramalai	3	-do-
06	Little Basses to Trincomalee	3	-do-
07	KKS Harbour	5	completed
08	Approaches to KKS	4	In progress
09	KKS to Delft	4	-do-
10	Kalpitiya Lower	4	-do-
11	Mannar Island	4	-do-

Table 1 – Coverage of New Surveys

In addition to the above new surveys, NHO has involved in bathymetric surveys providing consultancy services to local institutes such as Department of Coast Conservation and Coastal Resources Management, Sri Lanka Ports Authority, Ceylon Fishery Harbour Corporation, China

Harbour Engineering Company limited, National Aquaculture Development Authority etc.

2.2 Problems Encountered

Most of the hydrographic survey activities and capacity building activities were affected due to existing Covid-19 pandemic and survey calendar had to re-arrange as per the new normal. In addition, NHO requires enhancing capacities in maintaining its new chart portfolio when it is completed. Accordingly, it is required to work on preparation and publishing supporting nautical publications including Sailing Directions, List of Lights, and Tide Table etc. covering its waters.

3. New Charts and Updates

3.1 ENCs

Table 2 provides details of ENCs currently published /in progress of production after fresh hydrographic surveys.

Sr.No.	Scale Band	Cell No.	Area	Remarks
01	4	LK401500	Weligama Bay	Published
02	5	LK500109	Hambanthota Harbour	-do-
03	4	LK400109	Approaches to Hambanthota	-do-
04	5	LK5G16C3	KKS Harbour	-do-
05	4	LK4PG16C	Approaches to KKS	In progress
06	5	LK5G03D4	Colombo Harbour	-do-
07	4	LK4PG03D	Approaches to Colombo Harbour	-do-
08	5	LK5G04A1	Galle Harbour	-do-
09	4	LK4PG04A	Approaches to Galle Harbour	-do-

Table 2: Details of ENC production

At present, the SOLAS requirement of maintaining up to date nautical products within the waters of Sri Lanka is met by UKHO under a bilateral arrangement. However, it is envisaged that NHO in collaboration with UKHO and other supportive hydrographic offices will develop capacities towards producing its own ENCs and INT charts for entire area of Sri Lankan waters within next couple of years. Accordingly, Sri Lanka has produced 04 LK ENCs.

3.2 INT Charts

Sri Lanka has not produced any INT charts yet. However, NHO is planning to produce new INT chart for Approaches of Colombo and Colombo Harbour, Hambantota Harbour and Approaches and Colombo to Weligama on completion of joint survey with Indian Hydrographic Department and other on-going surveys.

3.3 National Paper Charts

No new national paper charts were published during the period.

4. New Publications and Updates

Nil

5. Maritime Safety Information [MSI]

MSI	**Y/N**	**Comments on MSI:**
Local warning	NO	NAVAREA warnings disseminated through India being NAVAREA VIII coordinator
Coastal warning	NO	
Nav warning	NO	
Port warning	NO	
GMDSS	**Y/N**	**Comments on GMDSS:**
Master Plan	NO	
Area A1	NO	
Area A2	NO	
Area A3	NO	
NAVTEX	NO	
SafetyNet	NO	

Table 3: Details of Maritime Safety Information

6. C-55

The updated C-55 table is attached as Annex ‘A’ to this report.

7. Capacity Building

7.1 Training Received

Since the last NIOHC, following training opportunities have been received from regional navies and through IHO Capacity Building programme.

SR. No	Name of Training	Sponsored by	Country	Duration	No. of berths
1	CAT "A" Hydrography	Indian Navy	India	44 weeks	05
2	CAT "A" Hydrography	UKHO	UK	26 weeks	02
3	CAT "B" Hydrography	Indian Navy	India	44 weeks	04
4	CAT "B" Cartography	Korea	Korea	20 Weeks	01
5	ENC & paper chart production course	Indian Navy	India	06 Weeks	02
6	Survey Recorder I	Indian Navy	India	20 Weeks	01
7	Survey Recorder II	Indian Navy	India	10 Weeks	07
8	Survey Recorder III	Indian Navy	India	16 Weeks	04

Table 4: Training received from 2019-2021

7.2 Training Provided

Sri Lanka Navy Hydrographic School was established in 2014 and since then, has provided one Survey Recorder III course annually. From 2016 onwards, one Survey Recorder II course for the sailors of Sri Lanka Navy Hydrographic Service. In addition, Faculty of Geomatics, Sabaragamuwa University of Sri Lanka is conducting 4 year degree programme in geomatics and the expertise of NHO conduct lectures for students who are specialized in Hydrography in the said degree programme including six months industrial training programme at NHO. The programme is accredited as IHO/FIG/ICA Category B in Hydrography. In addition, NHO supports University of Ruhuna, University of Uva Wellassa and Southern Campus of Kothelawala Defence University for conducting Hydrographic modules in their degree programmes covering theory and practical aspects.

7.3 Training Needs

NHO expects capacity building on following aspects to meet future objectives of the NHO through NIOHC and IHO Capacity Building Fund:

a. On the Job training on MB surveying and processing
b. Training on MSI
c. Training on MSDI
d. Cartographic training for production of ENCs, AMLs & Paper Nautical Charts and their maintenance

e. CAT ‘A’ and CAT ‘B’ Hydrography training
f. CAT ‘B’ Cartographic Training
g. Training on hydrographic data processing, interpolation and database management.

8. Oceanographic Activities

Oceanographic activities were focused on enhancing ocean observation, prediction and forecasting. In addition, scientific and technological services were provided to a wider range of applications such as coastal constructions, living and non-living resource exploitation, and energy harnessing including feasibility studies and environmental impact assessments (EIA). Further, water pollution researches and assistance to estimate damage to ocean environment was carried out in different areas in the fire incident of MV New Diamond ship off South East of Sri Lanka and fire incident of the sunken ship MV Express Pearl off Colombo Harbour. In addition following Oceanographic activities were conducted by NARA.

8.1 DCP Deployment

Subsurface mooring off the Southern coast is recovered in January 2021 after one year deployment at a depth of 500m. The mooring is attached with Acoustic Doppler Current meter (ADCP) and Mini CTD. The deployment is a part of a collaborative project with First Institute of Oceanography, P.R. China. RV Samudrika was utilized for recovery operation.

Figure 4: RV Samudrika was utilised for bouy recovery mission

8.2 Sea glider Deployment

Sea glider SG530 is deployed for a period of one year from March 2019. The deployment is a part of a collaborative project with University of Notre Dame, USA.

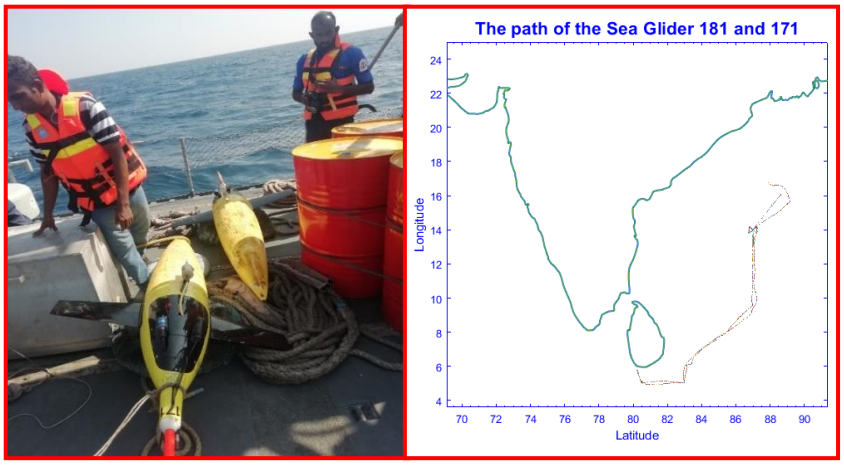

Figure 5: Sea glider deployment & path

8.3 Tide Gauge Network

Sri Lanka Navy Hydrographic Service is maintaining 06 manual tide monitoring stations (figure 6) at Colombo, Kalpitiya, Delf Island, KKS, Trincomalee and Hambanthota with an archive of tide data since 2015 in order re-establish Mean Sea Level thus the Chart Datum around Sri Lanka. Further, three real time transmitting permanent sea level stations are operating in West (Colombo), South (Mirissa) and East coasts (Trincomalee) of Sri Lanka operated by NARA and Colombo sea level station has equipped with 02 pressure sensors, 02 floating gauges and radar sensors. It measures sea level every 01 minute and transfers data every 15 minutes via Japanese Meteorological Satellite (JMA) and MeteoSat. Stations at Colombo and Mirissa measure sea levels every 01 minute and transfer data every 15 minutes via GPRS technology.

9. Spatial Data Infrastructure

Ministry of Defence currently maintains data repository with respect to hydrographic and oceanographic data of the country. Online portal for MSDI is not yet established. However, data is available for government organizations on demand as per availability.

10. Innovations

Having pooled resources of SLNHS and NARA, the NHO utilizes state of the art modern technologies, equipment and software applications to conduct surveys and produce nautical charts.

11. Other Activities

11.1 Participation for IHO meetings

Delegations from NHO participated for following IHO meetings during the period from 2019 to 2021.

a. IHO Assembly (A-2)
b. IRCC 12
c. IRCC 13
d. CBSC 19

11.2 Coastline Re-confirming Project

Sri Lanka Navy Hydrographic Service and Survey Department of Sri Lanka collaboratively conducted coastline survey in re-confirming the coastline of Sri Lanka and its Islands.

11.3 Submission to CLCS

NHO provides expertise and Hydrographic assistance to National Ocean Affairs Committee [NOAC] in pursuing of submission forwarded to the Commission on the Limits of the Continental Shelf [CLCS] for extension of outer continental margin of Sri Lanka.

11.4 Conducting VTC discussion sessions with Member States of NIOHC

Due to pandemic situation, physical meetings with Member States within NIOHC were affected. Therefore, Sri Lanka being NIOHC chair arranged monthly VTC training sessions on hydrography related topics to enhance the knowledge and working capabilities of Member States of NIOHC, which appreciated by all the Member States of NIOHC.

11.5 Environmental Assessment of Lagoons

Development of lagoons of Sri Lanka has been identified as a strategy to uplift social and economic status of coastal communities through development of aquaculture, tourism, fishing and Infrastructure. The project was formulated to achieve targets set by Sustainable Development Goals by the Ministry of Fisheries and Aquatic Resources Development and Rural Economy.

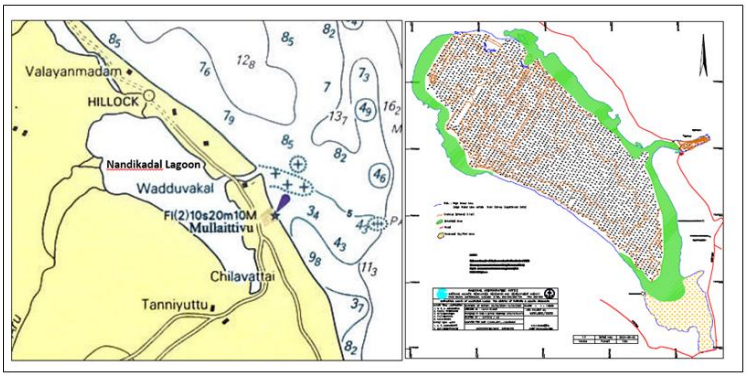

Figure 6:– Bathymetric maps to prepare environmental profiles and the management plans.

11.6 Beach Profile and Bathymetric Survey for Environmental Monitoring Studies of Colombo Port City development Project

The government of Sri Lanka has designed to implement a reclamation project covering approximately 500 acres of sufficient land area between the Colombo South harbour and the Galle Face Green to create "port city". The NHO has conducted the beach profile and bathymetric surveys to monitor the physical characteristics of the sea bed and provide data to assess the potential impacts to seabed morphology/topography, 10 km north and 10 km south of the above proposed site (Figure 7 & Figure 8)

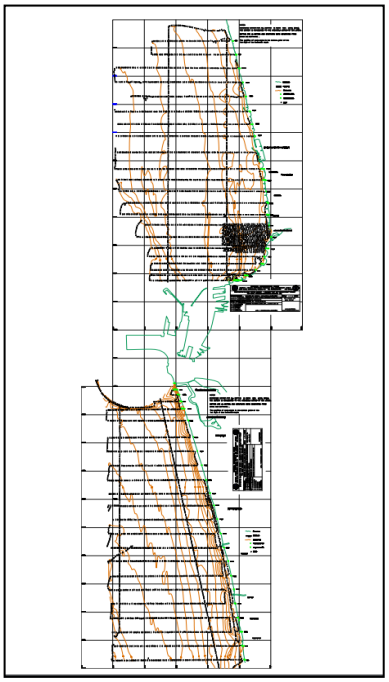

Figure 7: Bathymetric Survey

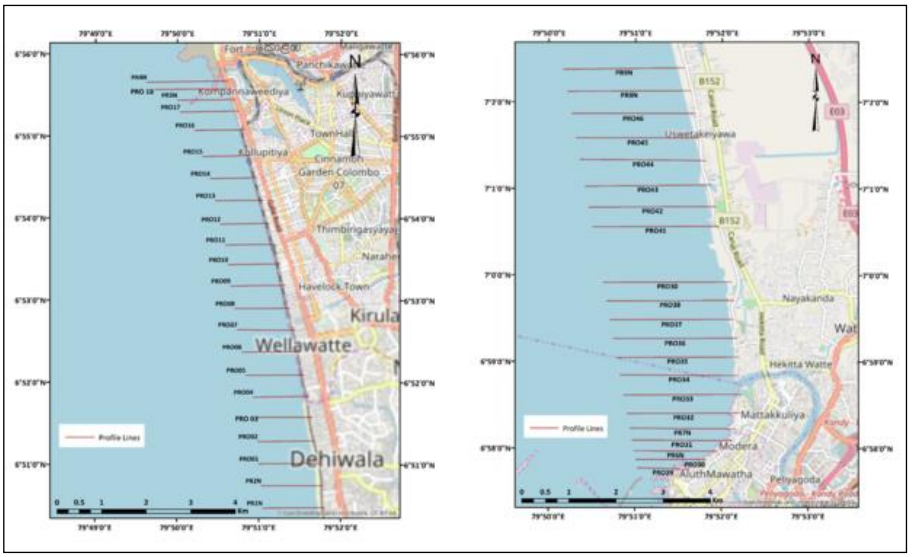

Figure 8 : Survey plan

11.7 Project on establishment of database and online data processing unit for Crowd sourced bathymetry parallel with the Seabed 2030 global mapping project of GEBCO/Nippon Foundation

The objectives of this project is to gather Crowd Sourced Bathymetry from all the possible means (Research Vessels, commercial ships, fishing vessels, satellite derived bathymetry etc,) and collaborate with the global project to get involve to process bathymetric data online. During year 2020, NHO has established the database in ESRI ArcGIS and collecting bathymetric data from the available sources. Such collected data have been feeding to the database with the metadata information. Further, it is planned to install fish finders to the fishing vessels to gather depth information. It is planned to contribute to the Seabed 2030 mapping project by indicating available bathymetric data coverage with appropriate clearance from relevant government authorities.

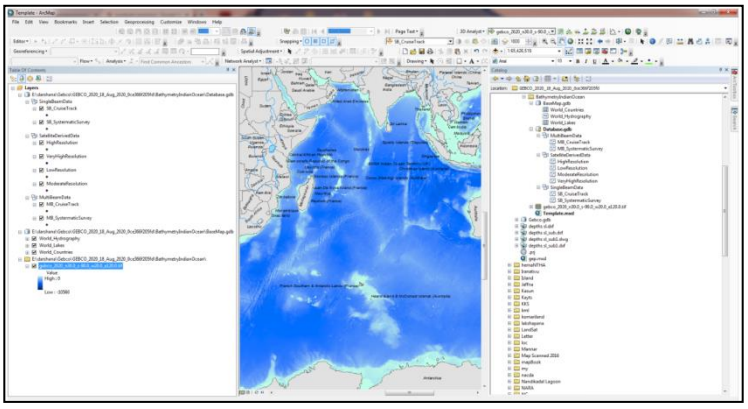

Figure 9 – Crowd Sourced Bathymetry Database in ArcGIS interface

11.8 Project on an assessment of Tidal asymmetry around the Sri Lankan coastline

This project has been conducted bearing the objectives of identifying the influence to the tidal phenomenon around the coast line caused by the two amphidromic points (Fig: 10) located in the Indian Ocean, identify the interaction boundaries of these two amphidroms along the coast line and the development of a comprehensive regional tidal model for Sri Lankan coastline. This information is very useful in tidal datum establishment for hydrographic applications such as national charting as well as further densification of the tidal network around Sri Lanka. Further, investigations can be carried out regarding the MSL variation and the geoid undulation determination.

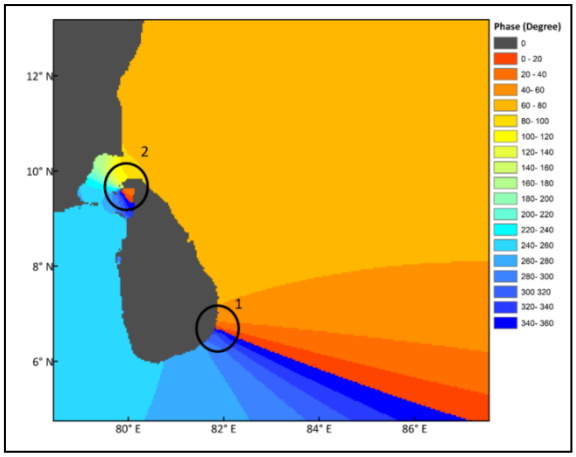

Fig 10: Two degenerated amphidrome of M2 constituent

11.9 Investigating vulnerability of coastal erosion in Kaluthara

Coastal erosion is becoming a serious environmental issue worldwide due to sea level rise along with climate changes caused by global warming. This study will be focused on Kalutara which is a significant coastal area as the river mouth of Kalu Ganga is located. The sand dunes are important geographical feature in the area and it protected Kalutara town from sea waves. The final output of the project will contribute to fulfil the existing gap by contributing for decision making relevant to coastal environmental protection and policy planning. The literature review part is completed and due to the COVID 19 pandemic, the process of the purchasing of satellite images and field work were hindered and couldn't continue the project within the year 2020. Further, purchasing of satellite images is in progress.

Therefore, the freely downloaded satellite images and Google earth images were used for extraction of coastlines from 2005 to 2017. The digitized outlines were opened in ArcGIS to identify the spatial variation. Seasonal variations of the sandbar were observed for the period of 2005-2017. This is mainly happening during the southwest monsoon period prevailing from May to September. Also both the erosion and accretion have to be measured in GIS environment in order to get the relationship with monsoonal periods.

Figure 11: Sandbar in 2005 (blue), 2010 (orange) and 2015 (red)

12. Conclusion

The current development of Covid-19 pandemic around the world had greater impact on hydrographic world and Sri Lankan survey activities were also greatly affected by the pandemic. However, with the joint collaboration with NARA and SLNHS, NHO is striving to carryout Hydrographic surveys for coastal charts and ENC productions amidst budgetary constraints to provide updated nautical information for marines and keep in pace with acquisition of modern skills such as developing MSDI, CSB, developing capacity for ENC production, deriving shallow water bathymetry by using high resolution satellite imageries and evaluating existing charts for adequacy. In this endeavour, NHO Sri Lanka seeks collaboration of regional Hydrographic offices through NIOHC in achieving its future goals and objectives in view of providing professional Hydrographic services to its stakeholders.